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Pest Facts

Cockroaches

Many scientists describe the cockroach as a evolutionary marvel. Largely unchanged from fossils dating from over 350 million years ago, cockroaches are truly the success story of the animal kingdom. Outside of scientific curiosity, however, cockroaches are commonly looked upon with disdain. Associated with filth and decay, millions of dollars are spent or misspent each year on their destruction. Yet, they still persist. Fortunately, successfully managing a cockroach infestation is not hopeless. A well designed and implemented program is often successful in reducing cockroach numbers. The following information will help you understand cockroach biology in order to build a successful management program.

Know Your Adversary

The first step in managing any pest problem is to know what you are dealing with. Each of the domestic pest cockroach species prefers different areas to live and breed so proper identification is important in designing a program. However, before we discuss individual species, let us examine common characteristics.

Generally, a typical infestation is comprised of individuals of different sizes, including reproducing adults with wings (usually) and immature individuals that are wing-less. Unlike some insects, immature and adult cockroaches occupy the same habitat and eat the same foods.

Immature cockroaches, called nymphs, are smaller than the adults and hatch from egg cases that the female deposits throughout the habitat. As the nymph grows, it sheds its “skin” or exoskeleton. Each nymphal stage is larger than the previous one, and the adult emerges after the last nymphal stage. Each cockroach species has a unique number of stages.

All stages may be identified, but the features of the adult are more distinctive. Identification is not difficult, but you must recognize certain features on the insect’s body.

Head- On the head, cockroaches have chewing mouthparts that are called mandibles. Additionally, they have a pair of compound eyes which are effective in distinguishing light from dark, but not much else. These pests are nocturnal. Also, on the

head is a pair of long, well-developed antennae. These are sensory organs that detect odors and air vibrations.

Thorax- All cockroaches have three pairs of legs on the thorax. Adults of most domestic species have two pairs of wings, although one species, the oriental, has poorly developed wings. Even though they have wings, cockroaches are poor flyers. They do have excellent running abilities, however. Additionally, there is a large plate-like structure in the thorax, just behind the head. This structure, the pronotum, has color patterns that distinguish several cockroach species and protects the head.

Abdomen- The abdomen houses the reproductive organs and much of the digestive system. Eggs are enclosed in a tough egg case which protects them from desiccation. The German cockroach female carries her egg case around until the eggs are ready to hatch. Other species often glue their cases to objects for protection or just drop them anywhere.

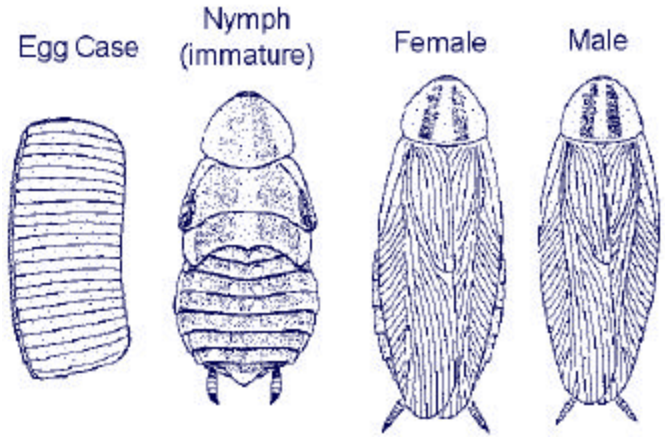
On the end of the abdomen, there are a pair of cerci (projections that serve as sensory organs). Ceri function in a manner similar to antennae, sensing vibrations through air or ground. Cerci are directly connected to the legs of the cockroach via abdominal nerve ganglia which is important to survival. Whenever a cockroach "feels" something near, it starts to run, even before the brain receives the signal.

Life Cycle, Behavior and Habitat-The Specifics

German Cockroach (*Blattella germanica*)

Appearance

The German cockroach is about 5/8" in length, brown in color, with two dark longitudinal streaks on the pronotum. The male is light brown and somewhat boat shaped. The female is slightly darker in color with a broader and rounded back. Nymphs are similar in appearance to adults but wingless with 2 dark bands running halfway down their back. Nymphs range in size from 1/8 to ½" in length.



Life Cycle

The female cockroach produces an egg case or capsule containing 30-40 eggs. After producing the egg case, the female carries it for about three weeks until the eggs hatch. She then goes into hiding before dropping the case. This behavior reduces the risk of harm to the female and the young. The immature cockroaches grow fast. Nymphs that emerge from the egg case will molt six or seven times in about 60 days. After the last molt, an adult emerges fully winged and sexually mature.

The female will produce four to eight egg cases during her lifetime. That can be over 300 offspring from a single female. After about 60 days, the nymphs that hatched from the first egg case will be mature adults ready to produce their own offspring. If half of these are females, and each produces 300 nymphs and half are females, etc. From the original female there could be more than 100,000 cockroaches in one year.

Behavior and Habitat

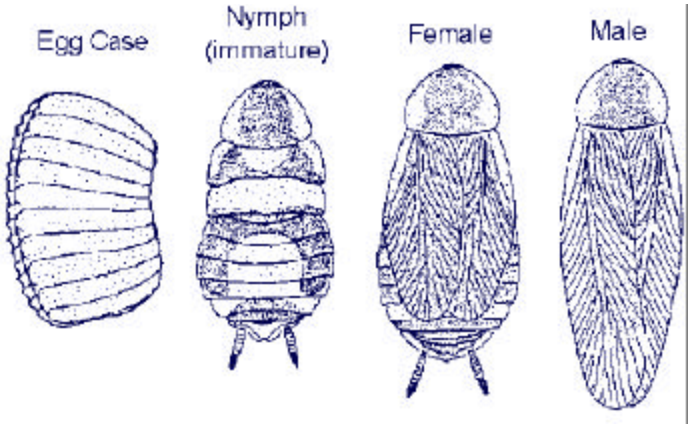
German cockroaches gather, or aggregate, in dark places that have high humidity, contain paper, wood and other porous surfaces and have plenty of food. They aggregate in these areas because the surfaces are “marked” with a pheromone, found in their droppings. This aggregation pheromone is very attractive to the nymphs. The result is that German cockroaches congregate in areas near porous surfaces that have little air circulation, are dark and have large quantities of their own droppings. Examples include; cracks and crevices, wall voids, in and around refrigerators, dishwashers, stoves, washers, dryers and water heaters.

German cockroaches thrive in undisturbed, protected areas that contain food and water. The most favorable humidity levels are found in kitchens and bathrooms under and around toilets, bathtubs, showers and sinks. They especially like sink traps, leaking faucets, standing water and wet sponges. German cockroaches will not leave these areas unless they are forced out. If food, water and shelter are available, the population will expand.

Brown-banded Cockroach (*Supella longipalpa*)

Appearance

The adults are rather small extending about 5/8” in length. The adult male is slender in appearance with its wings reaching beyond the abdomen tip. Adult females have shorter wings that expose a considerable portion of the broad abdomen. They have two light yellow or cream colored bands across their backs. These bands tend to be hidden by the



wings in the adult. The markings of the brown-banded cockroach are roughly crosswise while those of the German cockroach are lengthwise.

Life Cycle

The egg case, containing 13-18 eggs, is usually glued to inconspicuous places in the habitat, such as furniture, cabinets, behind pictures, walls and ceilings. Egg cases hatch in about 50 days. In her lifetime (about 6 months) the female can deposit as many as 14 egg cases. Nymphs molt six to eight times over a five- to six-month time span, before emerging as sexually mature winged adults. Male brown-banded cockroaches readily fly when disturbed.

A single brown-banded female has the potential to produce about 250 offspring. But, because of the longer time it takes nymphs to grow into adults, large populations are not produced as quickly as German cockroaches. In addition, because egg cases are glued to objects in the environment soon after formation, they are susceptible to drying, attack by fungi and other mortality factors that produce a low hatch success rate.

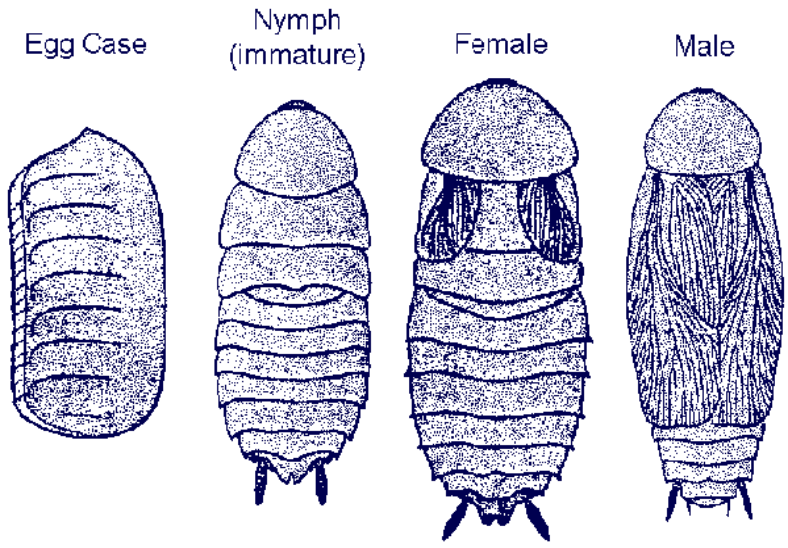
Behavior and Habitat

Brown-banded cockroaches build up their highest populations in high temperature areas. Because they require less water than German cockroaches, they often survive in drier location that are unsuitable for German cockroaches. They frequently occur in location at eye-level or above including cabinets, around closet shelves, behind pictures, in warm areas near motor units of refrigerators, electric clocks, timers, and television sets. Other favorable habitats are around the braces of kitchen chairs and tables, around objects on the wall and in shower stalls. Their egg cases can be found attached to rough surfaces like walls and textured ceilings but can also be found around the sink, desks, tables and other furniture.

Oriental Cockroach (*Blatta orientalis*)

Appearance

Oriental cockroaches are shiny, dark brown or black, about 1 to 1 ¼" long and have non-functional wings. Females are about 1 ¼" long, broad and have only little pads for wings. Males are about 1" long, more slender and have wings not reaching the tip of the abdomen. Nymphs are darker in color than adults, similarly shaped and wingless. Egg



cases are dark reddish brown, one inch long and appear slightly inflated.

Life Cycle

A single female has a much lower reproductive potential than either the German or brown-banded cockroach. The female Oriental can produce up to eight egg cases in a season, containing 16 eggs. Within about 2 days after the egg case is produced, it is placed in a sheltered area that contains abundant food. I about 2 months, nymphs emerge. Egg cases are susceptible to drying, attack by fungi and cannibalism.

Behavior and Habitat

Oriental cockroaches are not easily scared and are more sluggish than other cockroaches. They are more sensitive to water deprivation and like cool, damp locations. Look for Oriental cockroaches in dark, damp basements, crawl spaces, areas between soil and foundation, underneath sidewalks, in sewer pipes, floor drains and any other cool, moist place. Outside, they sometimes aggregate near or under refuse containers.

American Cockroach (*Periplaneta americana*)

Appearance

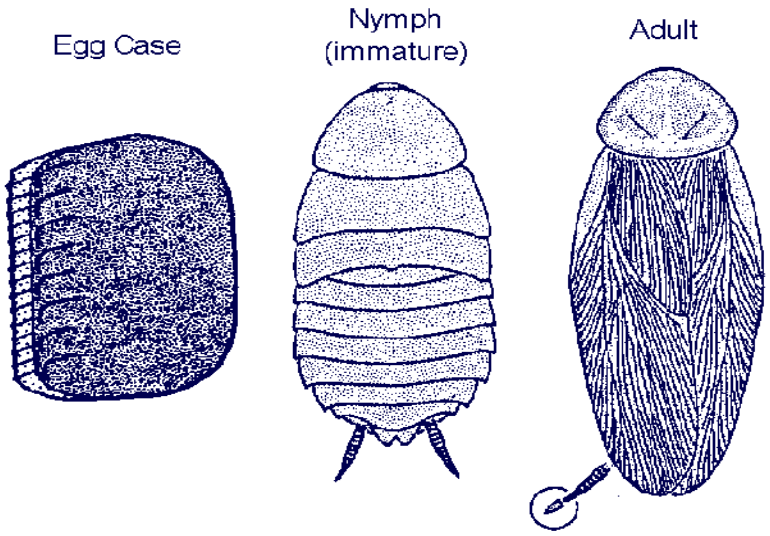
American cockroaches are the largest of the pest species, being 1 ½" long with fully developed reddish-brown wings and light markings on the thorax. The sexes are almost identical in size and appearance. The female has a broader abdomen than the male. However, only the male has both cerci and stylets. The wings of the male extend from 4 to 8 mm over the abdomen tip, while in the female they are equal to or slightly longer than the abdomen.

Life Cycle

The egg case contains approximately 14 eggs. It is often hidden in cracks and crevices several days after its formation. Nymphs emerge in about two months and undergo 13 molts, over the duration of six to 12 months, before reaching sexual maturity. The female can produce an egg case in about a week. Therefore, from 12 to 24 cases may be produced. Adults commonly live form one to two years.

Behavior and Habitat

American cockroaches are found most commonly where food is prepared. In addition, they may frequent boiler rooms, heated steam tunnels, basements around pipes and around water heaters and wet floor drains. They can co-exist with German cockroaches with no negative effects on either population.



INTEGRATED PEST MANAGEMENT-COCKROACHES

Exclusion

1) Cockroaches migrate easily through facilities via plumbing and electrical connections. Sealing gaps around plumbing, wall outlets and switch plates will prevent cockroaches from migrating from infested areas.

2) Keep doors and windows screened. Also, caulk cracks and gaps that may allow cockroaches indoors.

3) Cockroaches frequently enter facilities through dry drain traps. Periodically run the water to keep traps filled.

4) Fiberglass window screening over vent pipes will prevent cockroaches from migrating up from sewer connections.

5) Check all supplies before placing in storage areas

6) Store food on impermeable shelving in "tuperware" type containers or kept in cool refrigerated areas.

Sanitation

1) Indoor trash containers should be emptied frequently, kept clean both inside and outside. Plastic bags lining trash containers must be kept closed with ties and removed when full.

2) Filled indoor garbage containers should be removed from a facility immediately and placed in outdoor containers with tight fitting lids

3) Keep the area around dumpsters or other outdoor garbage storage areas clean and free of debris.

4) Clean and properly store or remove surplus equipment from the facility

5) Kitchen appliances should be cleaned daily, removing food debris.

6) Deep clean all areas in food preparation and service areas, including hard to access areas. Ensure there are no water leaks. Regular cleaning of food storage areas and shelves eliminates spilled or scattered food. Discard cardboard or porous packing material immediately to prevent food residue absorption.

Elimination of Moisture

1) Tighten loose pipes, patch plumbing leaks and replace faucet washers,

2) Water left in the sink after dish washing or found on the scullery floor provides water for cockroaches. These resources must be identified and removed.

3) A common source of moisture is condensation under refrigeration units. These areas should be frequently wiped dry, or if possible, have a pan placed under the appliance to collect water. The pan should be emptied frequently. Condensation on pipes (under the sink or in wall voids) is also a problem. Insulate these pipes if possible.

Elimination of Harborage

1) Adult cockroaches can fit into cracks only 1.6 mm wide. Any small gap or hole that leads to a void is a prime cockroach harborage area. Cracks and crevices of this kind should be identified and sealed.

2) Remove clutter (boxes, bags, paper, food, etc.). This allows for proper inspection and removes harborage sites.

3) Outside, remove debris and trash from facilities. Keep shrubbery and ornamentals well trimmed and removed from next to the facility.

Inspection

1) Design and implement a regular inspection program identifying potential breeding and harborage sites. Incorporate sticky traps to monitor areas throughout the day.

Education/Communication

1) Communicate with your customer concerning the importance of sanitation in reducing cockroach numbers. Explain what you are doing to address the problem. Make them part of the solution.

Chemical

1) Only use insecticides on an “as needed” basis as determined by surveillance. Applying pesticides on a schedule is often unnecessary and , in the long term, counter-productive.

2) Use only pest specific, reduced toxicity compounds. Incorporate gels, bait stations, and insect growth regulators.

3) Consult your pest management professional for advice concerning chemical treatment.

Evaluate

1) Review all management efforts to determine success. If necessary, modify your program to accommodate changes.

This publication contains general recommendations that are subject to change and update. For additional pest management information, please contact the Entomology Department at the Defense Supply Center Philadelphia-West Coast Support Office, Alameda, California at DSN 686-8122, commercial (510) 337-8122 or email paa5245@exmail.dscp.dla.mil.

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